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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,719	06/20/2005	Haruo Sakagoshi	5271-0112PUS1	5004

2292 7590 11/10/2009
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EXAMINER	
HAN, KWANG S	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/10/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/539,719	SAKAGOSHI ET AL.	
	Examiner	Art Unit	
	Kwang Han	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 July 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 13-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 13-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

NEGATIVE ELECTRODE FOR LITHIUM SECONDARY BATTERY, METHOD FOR PRODUCING SAME, AND LITHIUM SECONDARY BATTERY USING SAME

Examiner: K. Han SN: 10/539,719 Art Unit: 1795 November 6, 2009

Detailed Action

1. The Applicant's amendment filed on July 31, 2009 was received. Claims 19-21 were added.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 19 and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitations within claim 19 and 20 recite a "paint-film density". The specification as pointed out by the Applicant refers to a coating layer density within page 11, lines 11-14. For the purposes of examination it will be assume that the paint-film density is the Applicant's originally disclosed coating layer density.

Claim Rejections - 35 USC § 103

5. Claims 1, 6, 13, 18, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. (JP 2001-135304, machine translation) in view of Moriguchi et al. (US 6576369) is maintained.

Regarding claim 1, Taniguchi discloses a lithium ion secondary battery which is comprised of cylindrical (spherical) graphite carbon fibers with diameters from 5 to 50 microns, and scale-like (flat) graphite powder from 0.1 to 30 microns [Abstract] but is silent towards the sizes of the crystallites of the graphite and the tap density.

Moriguchi teaches a graphite powder suitable for a negative electrode material for a lithium ion secondary battery comprised of graphite powder having a crystallite diameter in the c-axis smaller than 100 nm and tap density of the graphite to be greater than 1.0 g/cm^3 (8:23-34; Columns 25-26) for the benefit of forming a lithium ion secondary battery with high discharge capacity and high charge/discharge coulombic efficiency [Abstract]. It would have been obvious to one of ordinary skill in the art at the time of the invention to have a crystallite diameter in the c-axis and a tap density to be greater than 1.0 g/cm^3 for the graphite particles of Taniguchi because Moriguchi teaches this forms a lithium ion secondary battery with high discharge capacity and high charge/discharge coulombic efficiency.

Regarding claim 6, Taniguchi discloses a ratio of the scale like graphite powder in the mixed composite is from 20 to 50 weight percent of the mixed composite [Abstract].

Regarding claim 13, Taniguchi discloses a lithium ion secondary battery which is comprised of a positive electrode, electrolyte [0030], a negative electrode with a binder further comprised of cylindrical (spherical) graphite carbon fibers with diameters from 5 to 50 microns, and scale-like (flat) graphite powder from 0.1 to 30 microns [Abstract] but is silent towards the sizes of the crystallites of the graphite and the tap density.

Moriguchi teaches a graphite powder suitable for a negative electrode material for a lithium ion secondary battery comprised of graphite powder having a crystallite diameter in the c-axis smaller than 100 nm and tap density of the graphite to be greater than 1.0 g/cm^3 (8:23-34; Columns 25-26) for the benefit of forming a lithium ion secondary battery with high discharge capacity and high charge/discharge coulombic efficiency [Abstract]. It would have been obvious to one of ordinary skill in the art at the time of the invention to have a crystallite diameter in the c-axis and a tap density to be greater than 1.0 g/cm^3 for the graphite particles of Taniguchi because Moriguchi teaches this forms a lithium ion secondary battery with high discharge capacity and high charge/discharge coulombic efficiency.

Regarding claim 18, Taniguchi discloses a ratio of the scale like graphite powder in the mixed composite is from 20 to 50 weight percent of the mixed composite [Abstract].

Regarding claims 19 and 20, Taniguchi is silent towards the paint-film density of the negative electrode.

Moriguchi teaches the packing density of the graphite powder to include ranges of 1.17g/cc or higher because the packing density (paint-film density) influences the

energy density per unit volume of an electrode (25:10-26:6) teaching it as a result effective variable. It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the packing density of the electrode since it has been held that discovering the optimum ranges for a result effective variable such as packing density involves only routine skill in the art in the absence of showing of criticality in the claimed range (MPEP 2144.05) In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Furthermore, it has been held that where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (MPEP 2144.05)

6. Claims 2 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. and Moriguchi et al. as applied to claims 1 and 13 above, and further in view of Mabuchi et al. (US 6156432) is maintained.

The teachings of Taniguchi and Moriguchi as discussed above are herein incorporated.

Regarding claims 2 and 14, Taniguchi and Moriguchi are silent towards the graphite particles where the surface of the graphite is covered with non-graphite carbon.

Mabuchi teaches a carbon material for a negative electrode of a secondary lithium battery formed by coating the graphite material with a low-crystalline carbon to stop the decomposition of the electrolyte solution, destruction of the negative electrode, and show a high value of charge/discharge efficiency (6:35-46). It would have been

obvious to one of ordinary skill in the art at the time of the invention to coat the graphite material of Taniguchi and Moriguchi because Mabuchi teaches this stops decomposition of the electrolyte solution, destruction of the negative electrode, and shows a high value of charge/discharge efficiency.

7. Claims 6, 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. and Moriguchi et al. as applied to claims 1 and 13 above, and further in view of Koyama et al. (US 2004/0101756) is maintained.

Regarding claims 6 and 18, the teachings of Taniguchi and Moriguchi as discussed above are herein incorporated.

Koyama teaches a negative electrode for a secondary battery which uses an aqueous resin binder and a rubber based resin in mixtures [0034-0035] for the benefit of having a larger binding effect than solvent type binders and increases the ratio of the active material in the same volume [0008]. It would have been obvious one of ordinary skill in the art at the time of the invention to use an aqueous and a rubber based binder in the negative electrode of Taniguchi and Moriguchi because Koyama teaches these binders have a larger binding effect and increase the ratio of active material.

Regarding claim 21, Taniguchi and Moriguchi are silent towards the use of a nonaqueous electrolyte comprising vinylene carbonate.

Koyama teaches that an electrolytic solution may contain an additive which improves cycle properties of a cell such as vinylene carbonate [0078]. It would have been obvious to one of ordinary skill in the art at the time of the invention to include

vinylene carbonate in the electrolytic solution of the lithium ion secondary battery because Koyama teaches it improves the cycle properties of the cell.

8. Claims 4 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. and Moriguchi et al. as applied to claims 1 and 13 above, and further in view of Sheem et al. (US 2004/0214087) is maintained.

Regarding claims 4 and 16, the teachings of Taniguchi and Moriguchi as discussed above are herein incorporated. Taniguchi and Moriguchi are silent as to the binding or agglomeration of the graphite particle to form a secondary particle.

Sheem teaches a negative active material for a rechargeable lithium battery which is produced by agglomerating a carbon material to form a secondary particle which has a core for the benefit of providing a negative active material which can prevent side reactions during charge/discharge and exhibit good reversible capacity and low irreversible capacity [0013, 0035, 0036]. It would have been obvious to one of ordinary skill in the art at the time of the invention to for a secondary particle from the graphite of Taniguchi and Moriguchi because Sheem teaches this process forms negative active material which has a core to prevent side reactions during charge/discharge and exhibit good reversible capacity and low irreversible capacity.

9. Claims 3 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. and Moriguchi et al. as applied to claims 1 and 13 above, and further in view of Takami et al. (US 5312611) is maintained.

Regarding claims 3 and 15, the teachings of Taniguchi and Moriguchi as discussed above are herein incorporated. Taniguchi and Moriguchi are silent as to the Raman intensity of the negative electrode materials.

Takami teaches a lithium secondary battery with a carbonaceous material for the negative electrode which exhibits a Raman spectrum with an argon laser having a peak resulting from the turbulence structure appearing at about 1360 cm^{-1} and a peak from the graphite like structure appearing at about 1580 cm^{-1} and having an R_1/R_2 range between 0.5-1.5 for a suitable negative electrode material (4:7-22). Takami further teaches if the ratio falls below 0.5, decomposition of the solvent in the electrolyte occurs and if the ratio exceeds 1.5, the absorbing and releasing quantity of lithium ions in the negative electrode decreases (4:22-28). It would have been obvious to one of ordinary skill in the art at the time of the invention to have a Raman spectrum with an R value at 0.4 or larger because Takami teaches optimization of this value allows for minimal decomposition of the solvent and increasing the absorbing/releasing quantity of lithium ions.

Response to Arguments

10. Applicant's arguments filed July 31, 2009 have been fully considered but they are not persuasive.

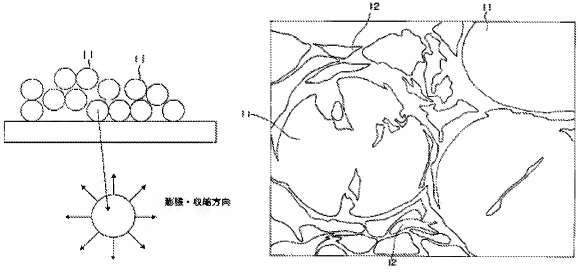
Applicant's principal arguments are:

(a) the cylindrical graphite carbon fiber and spherical or elliptical graphite are completely different from each other regarding their shape, and

(b) the swelling or shrinking of the cylindrical fiber should be three-dimensional like that of a spherical or elliptical graphite.

In response to Applicant's arguments, please consider the following comments:

(a) the cylindrical graphite as taught in the Taniguchi references is shown as a sufficiently spherical shaped particle (11) as shown in Drawings 1 and 5 of the reference and further shown below;



Furthermore as is well recognized by one of ordinary skill in the art, a cylindrical particle having a height close to its radius forms a sufficiently spherical particle and a cylindrical shape can be elliptical (elliptic cylinder). The Applicant has not presented any experimental data showing unexpected results as to having a specific spherical or elliptical shape to the primary particles of graphite A or combinations thereof,

(b) It is well known and recognized by one of ordinary skill in the art that graphite particles are three dimensional by the fact that they have a volume. Particles would

have a degree of swelling and shrinking of the particles in all three dimensions no matter the specific shape.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kwang Han whose telephone number is (571) 270-5264. The examiner can normally be reached on Monday through Friday 8:00am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. H./
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795